

National Aeronautics and Space Administration



Earth Science Fun Pad

PACKED WITH THINGS TO DO!



www.nasa.gov

**EXPLORE
MORE**



For more information on NASA
and its outreach programs, visit
these web sites:

<http://education.nasa.gov>

<http://nasascience.nasa.gov/>

<http://kids.earth.nasa.gov/>

<http://jointmission.gsfc.nasa.gov/>

<http://gpm.gsfc.nasa.gov/>

EARTH: OUR HOME PLANET

Color our world



- Earth is the third planet and 92,897,000 miles from the Sun.
- Earth is the fifth largest planet—almost 2 million square miles.
- There are 10 million species of life on Earth.

EARTH OBSERVING SATELLITE

Color this mission logo



The NPOESS Preparatory Project (NPP) is a joint mission between NASA, DoD, and NOAA. Its mission is to measure atmospheric and sea surface temperatures, humidity sounding, land and ocean biological productivity, and cloud and aerosol properties.

<http://jointmission.gsfc.nasa.gov/>

NAME THE 7 CONTINENTS

Unscramble the letters to find the answers

CARIFA _____

TANACTIRAC _____

SAIA _____

RIALASTUA _____

PEREOU _____

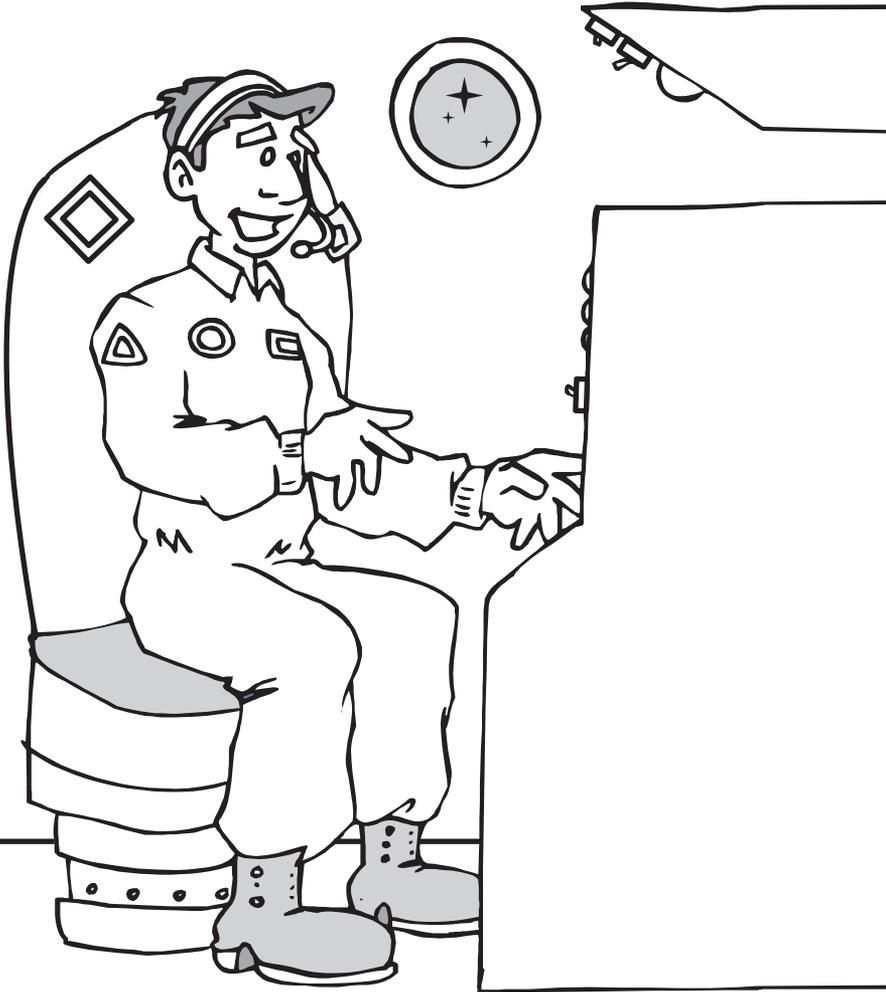
HORNT MIRACEA _____

OSHUT CAMEARI _____



EARTH COMMUNICATIONS

Find and circle these shapes



COMPUTER WORK

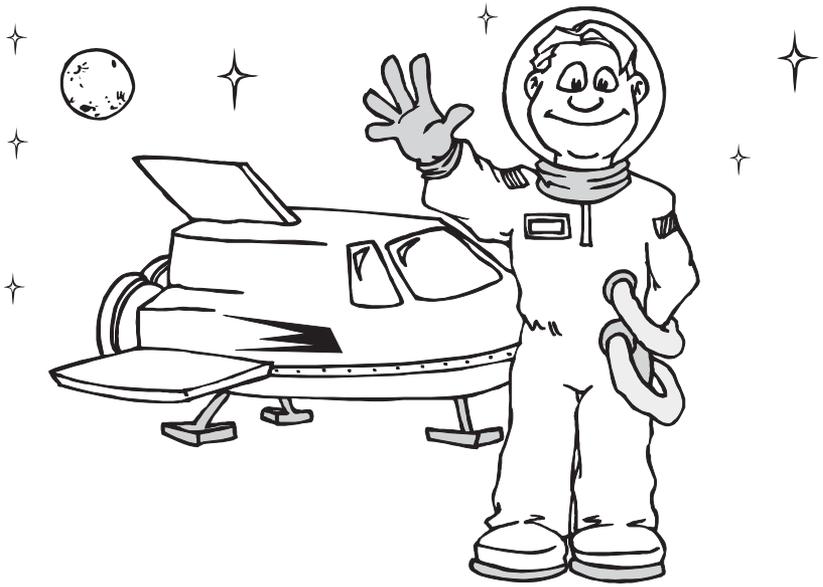
Computers are very important tools for studying the Earth.



Computers are used to write programs which control spacecraft and their scientific instruments. They are used to help test instruments before they are launched and for communications. Computers are used to study Earth and use this data to produce amazing images and evaluate environmental trends and new discoveries. They are also used to help pass this information on to the world through the internet.

DIFFERENT EARTHLINGS

Find and circle 8 different things



FIND A WORD

Search for NASA Earth Science words

D	L	R	O	W	I	S	N
E	N	O	Z	O	U	C	E
C	R	X	D	N	A	L	G
O	R	I	E	S	T	O	Y
S	E	Y	A	N	M	U	X
Y	T	N	R	S	O	D	O
S	A	S	T	C	S	A	L
T	W	K	H	L	P	U	S
E	E	Y	E	I	H	R	C
M	A	E	C	M	E	O	I
O	T	N	I	A	R	R	E
T	H	E	A	T	E	A	N
A	E	S	L	E	H	I	C
L	R	O	S	P	A	C	E

✓ NASA
AIR
ATMOSPHERE
ATOM
AURORA

CLIMATE
CLOUD
EARTH
ECOSYSTEM
HEAT

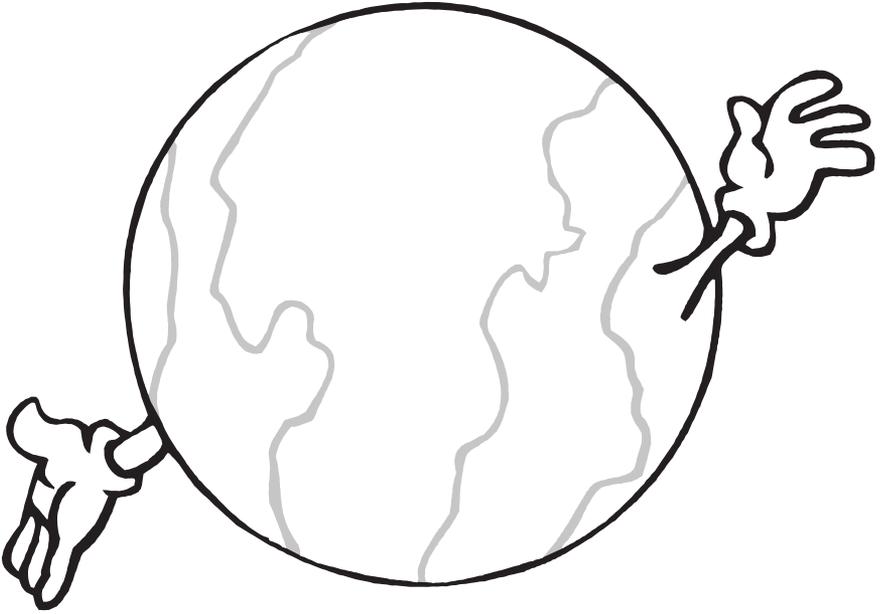
LAND
OXYGEN
OZONE
RAIN
SCIENCE

SEA
SKY
SLEET
SNOW
SMOG

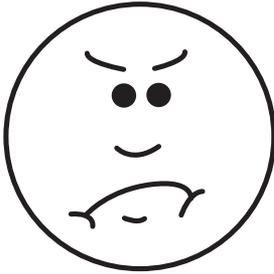
SPACE
SUN
WATER
WEATHER
WORLD

DRAW A FACE ON THE EARTH

Make it sad, mad or glad!



SAD



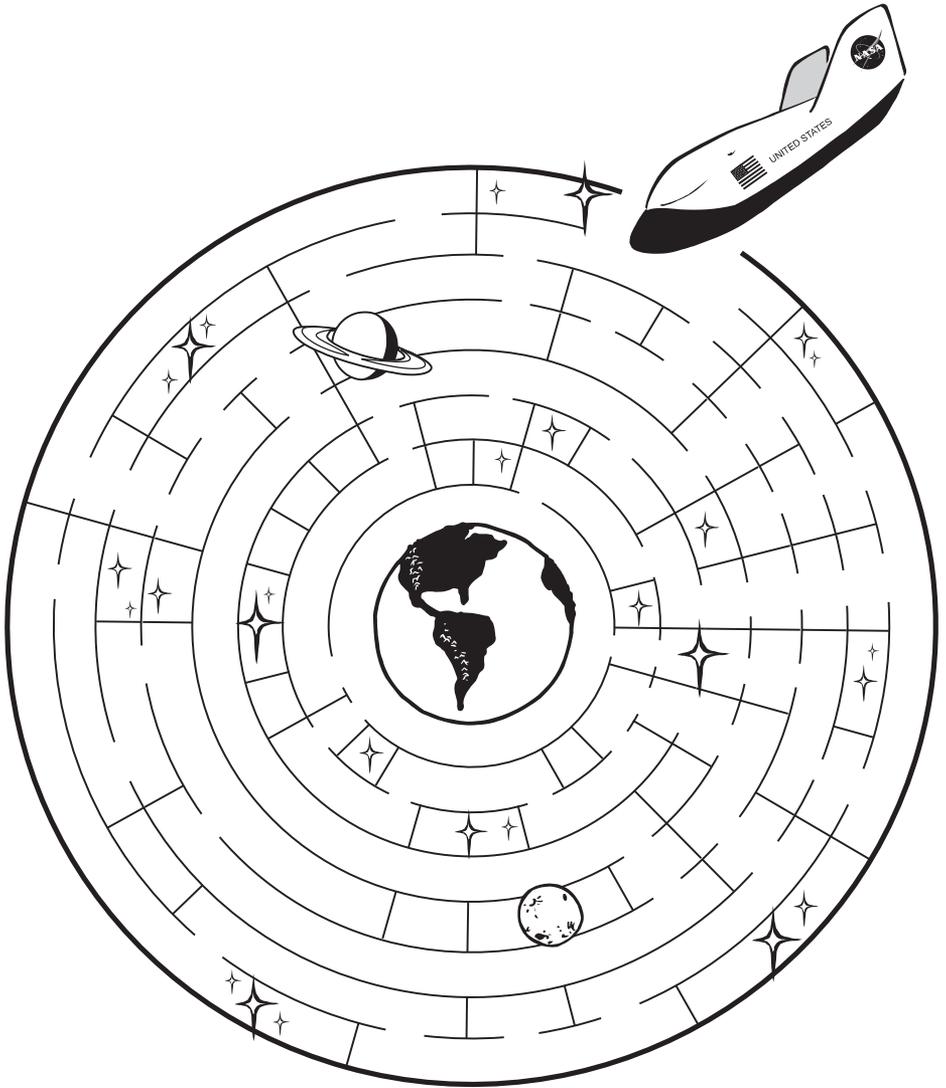
MAD



GLAD

RETURNING TO EARTH

*Get the Shuttle home to Earth
through the space maze*



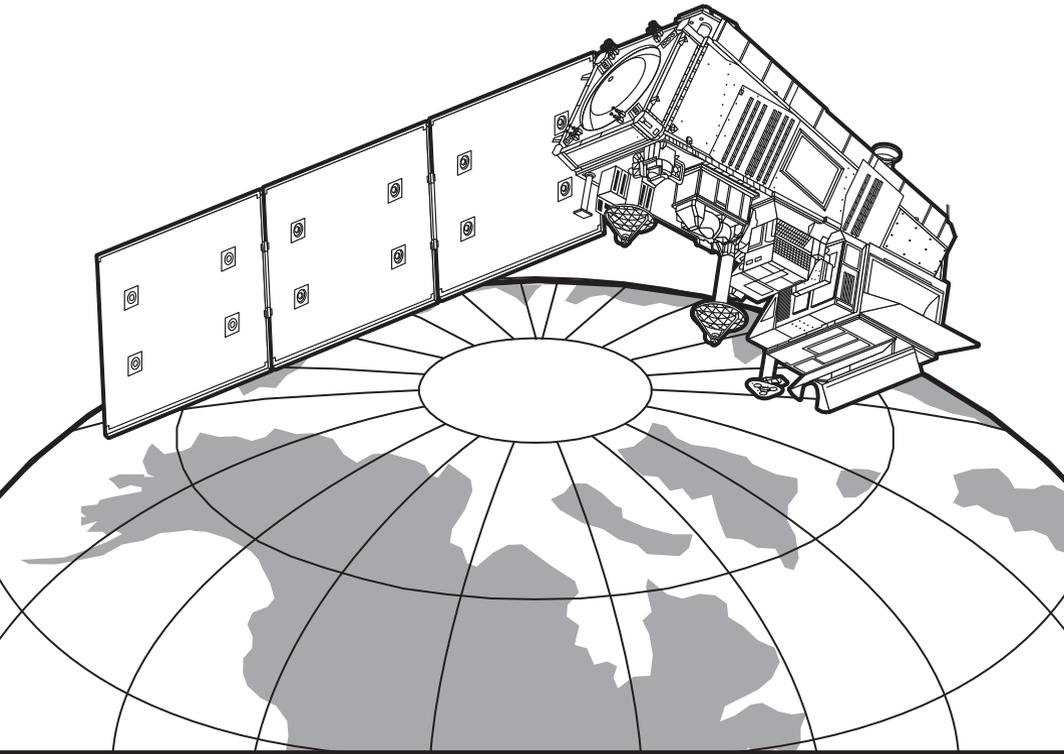
READY FOR BLAST-OFF

Color the Shuttle and Astronaut



NPP SATELLITE

A spacecraft that orbits Earth helps us study our atmosphere, weather, and climate.



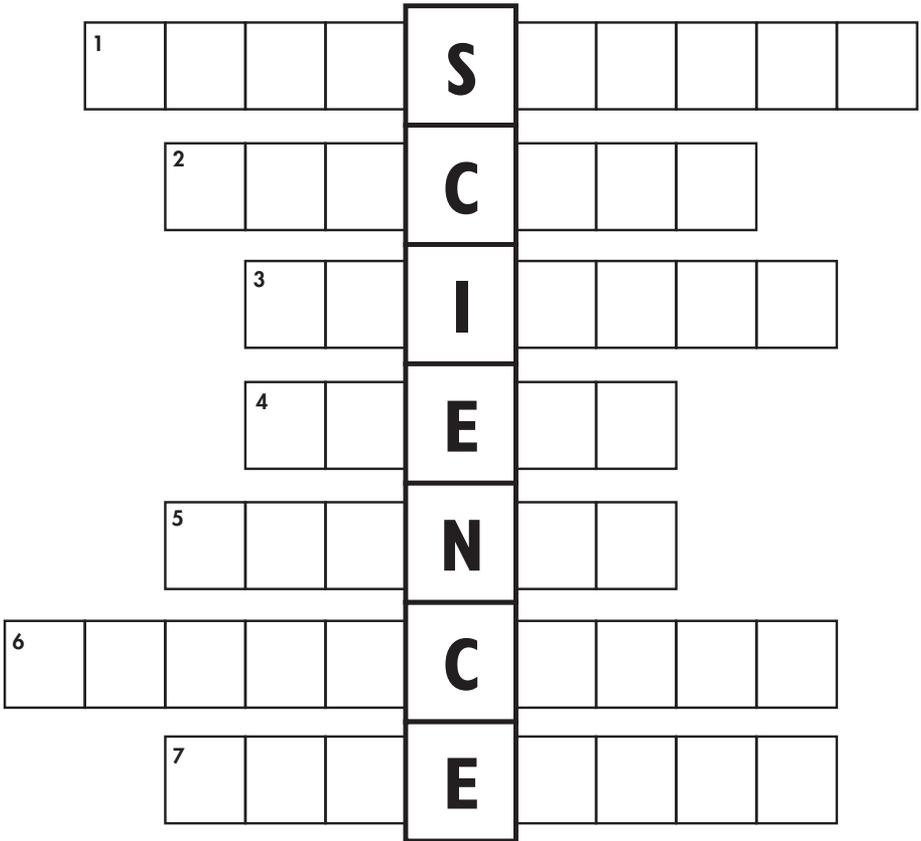
National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) mission has five scientific instruments that will provide atmospheric and sea surface temperatures, humidity sounding, land and ocean biological productivity, and cloud and aerosol properties.

NPP will be launched on a Delta II launch vehicle at Vandenberg Air Force Base in California.

<http://jointmission.gsfc.nasa.gov/>

SCIENCE CROSS WORDS

Answer the clues to find the words

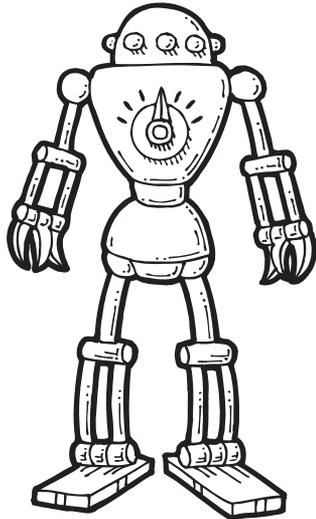
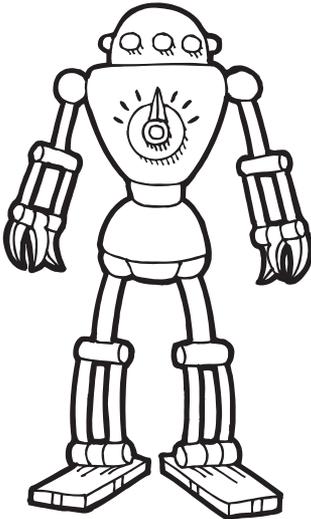
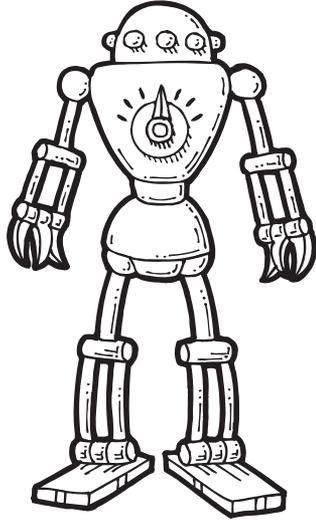
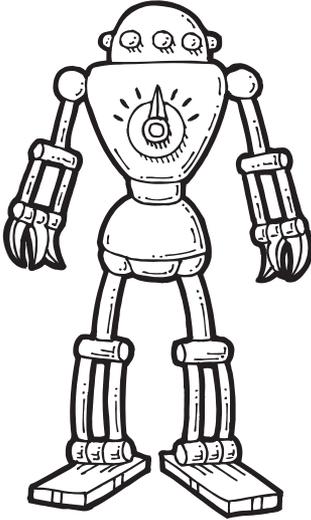


CLUES:

1. The mass of air surrounding the Earth
2. An opening in the earth's crust through which molten lava, ash, and gases are released
3. Weather condition in some locations/regions
4. A body of salt water that covers more than 70% of the Earth's surface
5. The Earth is one
6. A vehicle capable of traveling in outer space
7. Prediction of weather conditions

ROBOTICS

Which robot is different than the rest?



MOON DOGGIE

Color-by-number space dog



- | | |
|----------------|-----------|
| 1 - Green | 4 - Brown |
| 2 - Blue | 5 - Tan |
| 3 - Light Blue | 6 - Red |

STUDYING EARTH

*NASA Earth Scientists look
at the Earth and our universe*



NASA's unique way of looking at our world around us lets scientists study the global weather patterns of El Niño to Martian rocks and to galaxies far, far, away.

NASA scientists are beginning to find answers so we can all better understand our Sun and Earth, our solar system, and the universe beyond.

NASA SCRAMBLE

*Unscramble the words to spell out
what NASA means*



NASA brings you an exciting way to look at our Sun and Earth, our solar system, and the universe beyond. From high above our Earth, NASA satellites are studying Earth and space science as well as looking out at the distant worlds of the universe.

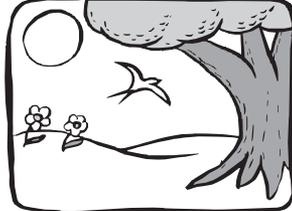
WEATHER OR NOT?

Name these weather conditions

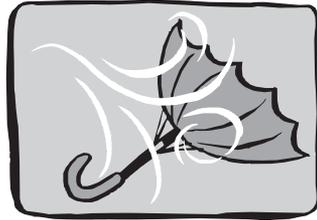












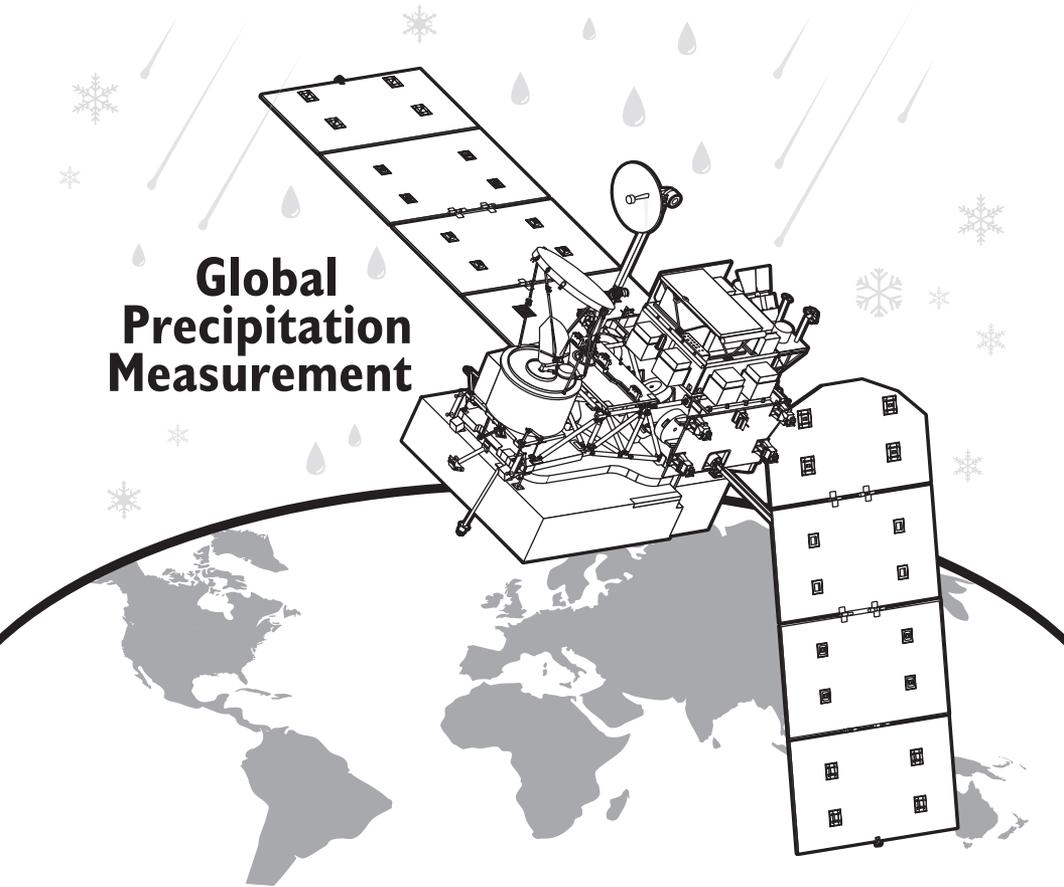




GPM SATELLITE

An international satellite mission measuring global precipitation within hours

Global Precipitation Measurement

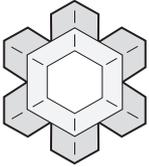


Knowing when, where, and how much it rains or snows around the globe will help us make better predictions of weather, climate, natural hazards (hurricanes, landslides, floods), and freshwater resources.

<http://gpm.gsfc.nasa.gov>

SNOWFLAKE SHAPES

There are differences in each snowflake



Stellar Plates

These common snowflakes are thin, plate-like crystals with six broad arms that form a star-like shape. Their faces are often decorated with amazingly elaborate and symmetrical markings.



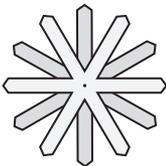
Sectoried Plates

Stellar plates often show distinctive ridges that point to the corners between adjacent prism facets. When these ridges are especially prominent, the crystals are called sectoried plates.



Stellar Dendrites

Dendritic means "tree-like", so stellar dendrites are plate-like snow crystals that have branches and sidebranches. These are fairly large crystals, typically 2-4 mm in diameter, that are easily seen with the naked eye.



12-Sided Snowflakes

Sometimes capped columns form with a twist, a 30-degree twist to be specific. The two end-plates are both six-branched crystals, but one is rotated 30 degrees relative to the other. This is a form of crystal twinning, in which two crystals grow joined in a specific orientation.



Fernlike Stellar Dendrites

Sometimes the branches of stellar crystals have so many sidebranches they look a bit like ferns, so we call them fernlike stellar dendrites. These are the largest snow crystals, often falling to earth with diameters of 5 mm or more. In spite of their large size, these are single crystals of ice -- the water molecules are lined up from one end to the other.

FIND A WORD

Search for NASA Earth Science words

W	E	N	A	S	A	L	T
O	K	A	I	Y	T	A	S
N	A	B	R	R	A	T	U
S	L	E	E	T	E	M	N
F	A	T	S	N	H	O	L
K	A	N	A	E	O	S	I
W	N	E	D	M	U	P	G
V	C	I	L	N	S	H	H
O	L	A	A	O	D	E	T
L	O	H	I	R	N	R	R
C	U	L	Y	I	I	E	E
A	D	K	A	V	W	C	S
N	S	R	E	N	E	W	E
O	T	R	E	E	D	F	D

-
- | | | | | | |
|------------|-------------|-------|-------|----------|---------|
| ✓ NASA | DESERT | LAKE | RENEW | SKY | TREE |
| AIR | EARTH | LAND | RIVER | SLEET | VOLCANO |
| ATMOSPHERE | ENVIRONMENT | MOON | SALT | SNOW | WATER |
| CLOUDS | HEAT | OCEAN | SAND | SUN | WIND |
| COAL | ICE | RAIN | SEA | SUNLIGHT | |

THE LIFE AROUND US

How many words can you spell using the letters in ENVIRONMENT?



1. _____

6. _____

11. _____

2. _____

7. _____

12. _____

3. _____

8. _____

13. _____

4. _____

9. _____

14. _____

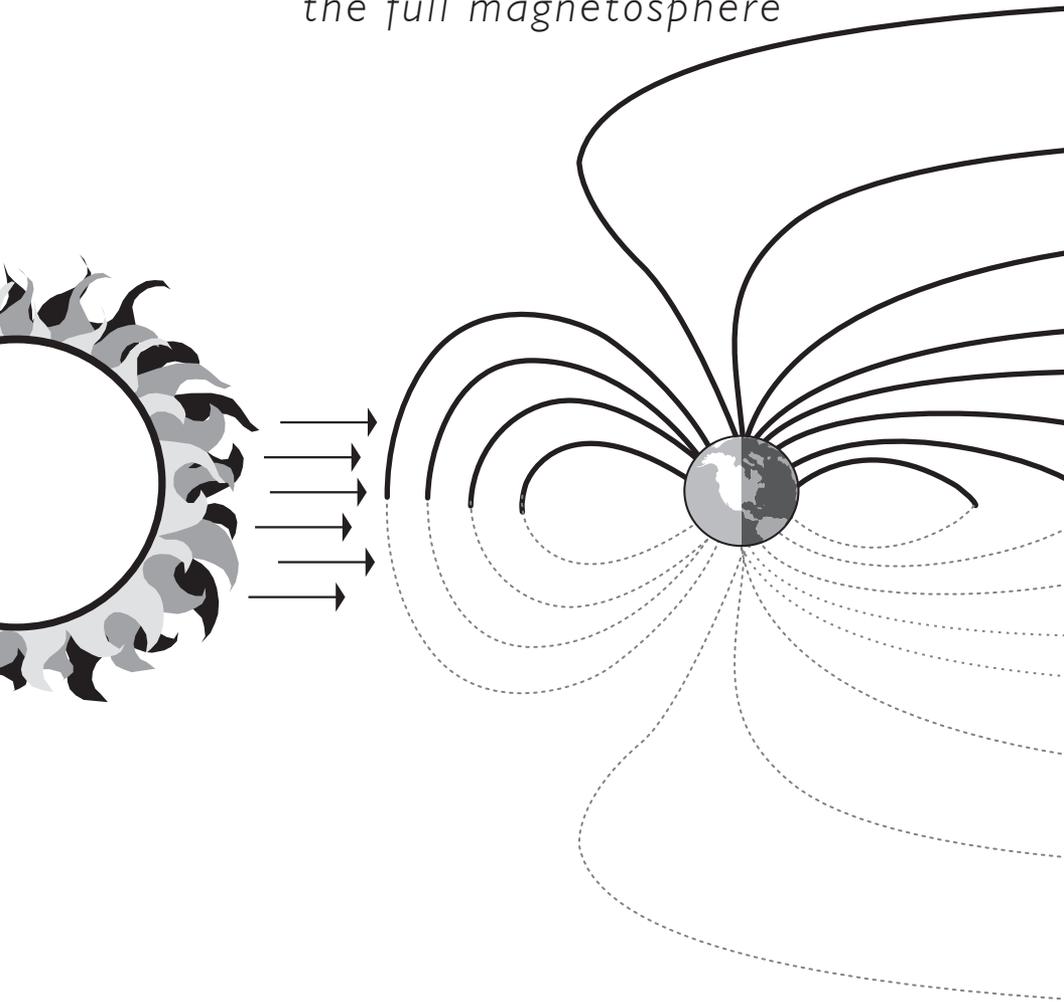
5. _____

10. _____

15. _____

MAGNETOSPHERE

Draw over the dotted lines to complete the full magnetosphere



Earth acts like a very large magnet producing invisible field lines. This magnetic field is enclosed in an area surrounding the Earth called the magnetosphere which shields our planet from the Sun's harmful radiation.

TREE FACTS

How trees help our environment

Two mature trees provide enough oxygen for a family of four.	Birds and animals use trees for their homes and shelter and as a source of food.
Trees are good noise barriers, making a city and neighborhood quieter.	Trees help cool down the Earth by cooling the ground and air around them.
Trees produce and give off oxygen while absorbing carbon dioxide and other gases and pollution.	Trees improve the water quality by acting as a filter to unwanted nutrients and pesticides.
Trees help prevent soil erosion and landslides.	Many trees can outlive humans – some can live more than 1,000 years.

Trees make our planet beautiful.

**PLANT A TREE
FOR A HEALTHY
EARTH!**



RHyme TIME

What other words rhyme with RAIN?

	_____
	_____
	_____ _____
	_____ _____
	_____

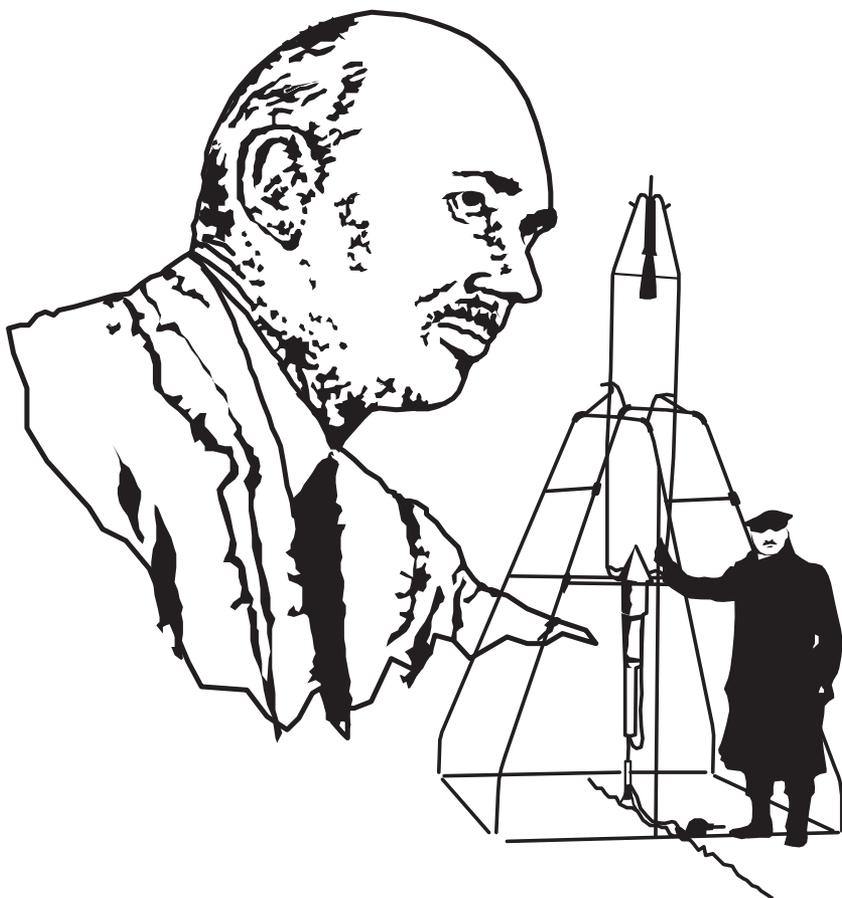
MAKING A DIFFERENCE

Find 8 things that are not the same



ROBERT H. GODDARD

*A man with a vision of rockets,
missiles, and space travel*



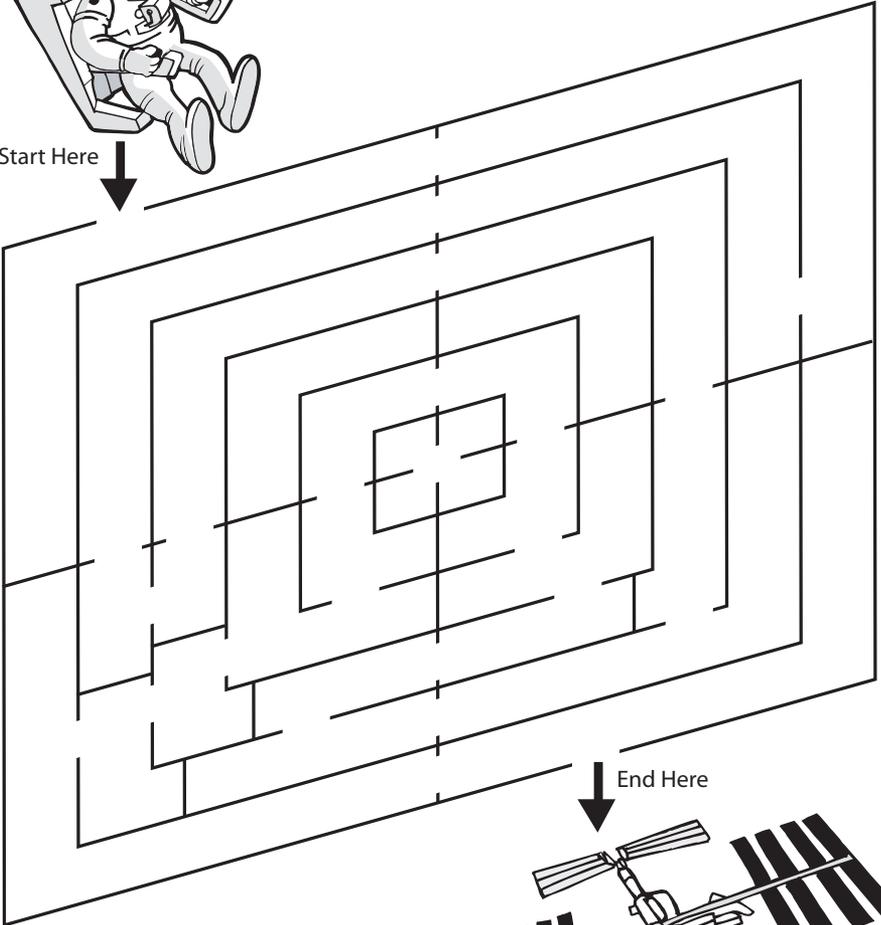
Robert Hutchings Goddard (October 5, 1882 – August 10, 1945), U.S. professor of physics and scientist, was a pioneer of controlled rocketry. He launched the world's first liquid-fueled rocket on March 16, 1926. From 1930 to 1935, he launched rockets that attained speeds of up to 550 mph. Though his work in the field was revolutionary, he was sometimes ridiculed for his theories.

A-MAZING SPACE

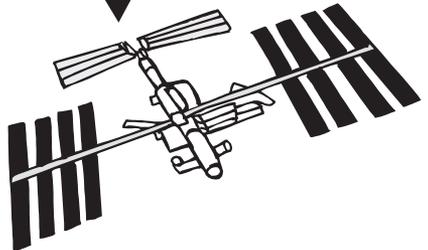
Get the astronaut back to the Space Station



Start Here

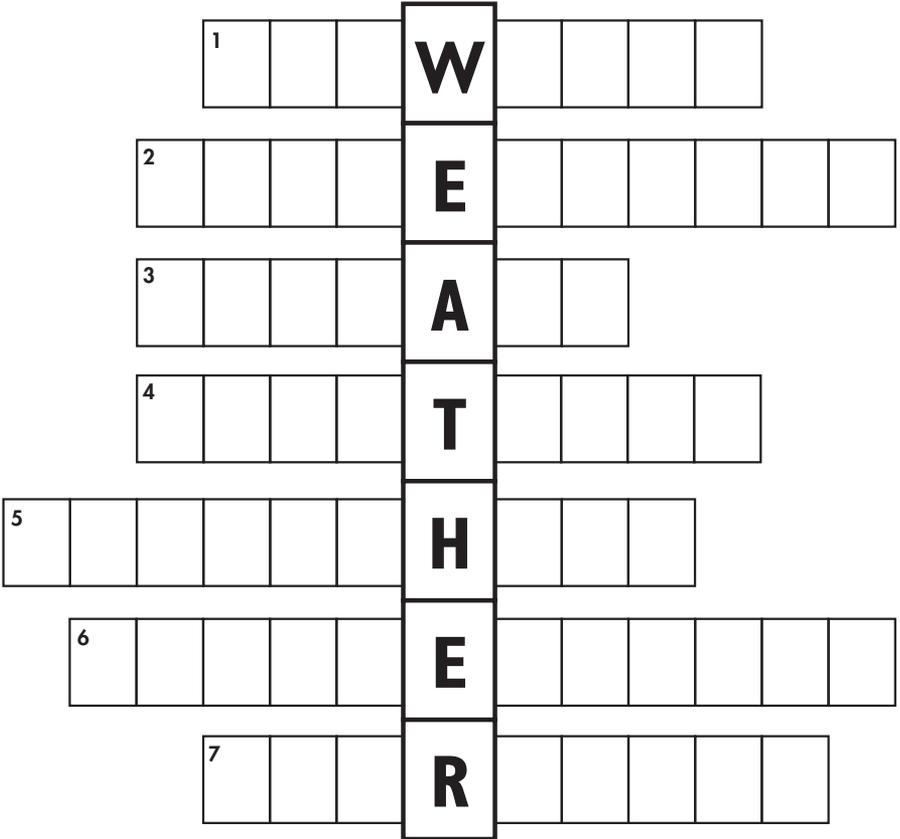


End Here



WEATHER CROSS WORDS

Answer the clues to find the words

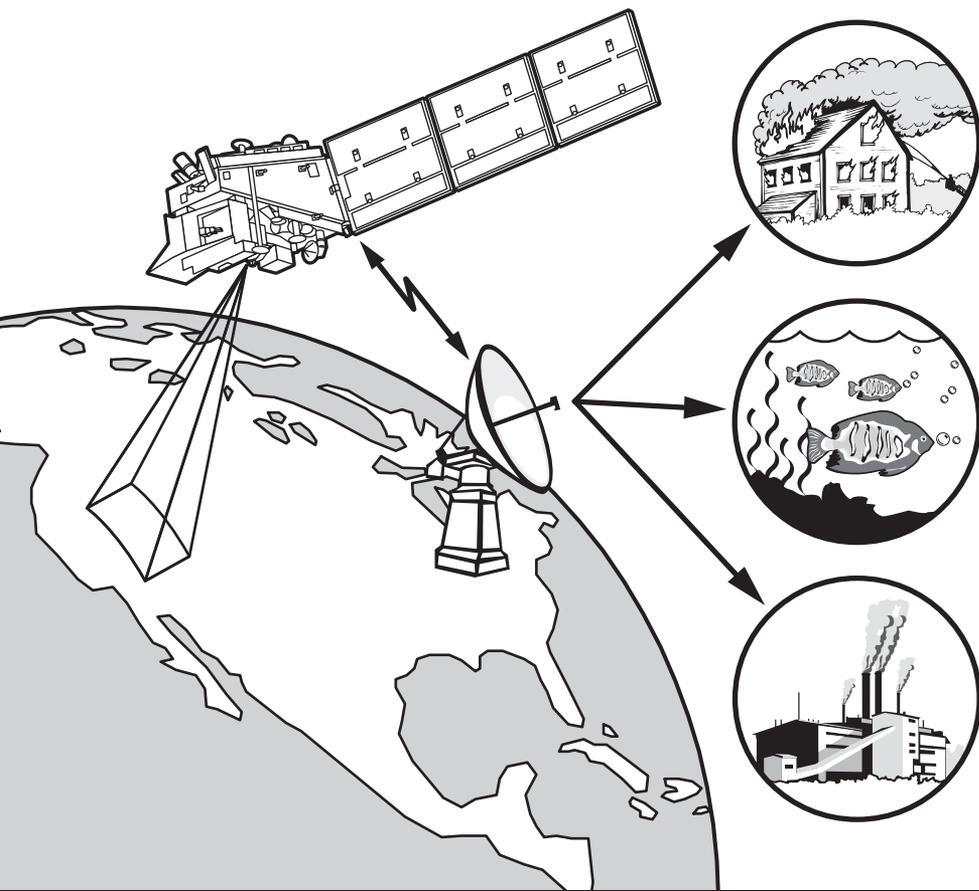


CLUES:

1. Measured depth of a certain precipitation
2. Degree measurement of hot or cold
3. A violent, rotating column of air attached to a thundercloud and the Earth's surface
4. A rapid, visible discharge of energy—hotter than the surface of the Sun
5. A blanket of air that surrounds the Earth
6. A short weather event that contains rain, wind, lightning, and hail
7. Tropical cyclone with 74 mph winds or greater seen in the North Atlantic Ocean, Caribbean Sea, and Gulf of Mexico

DIRECT READOUT LABORATORY

Helping us to see the Earth

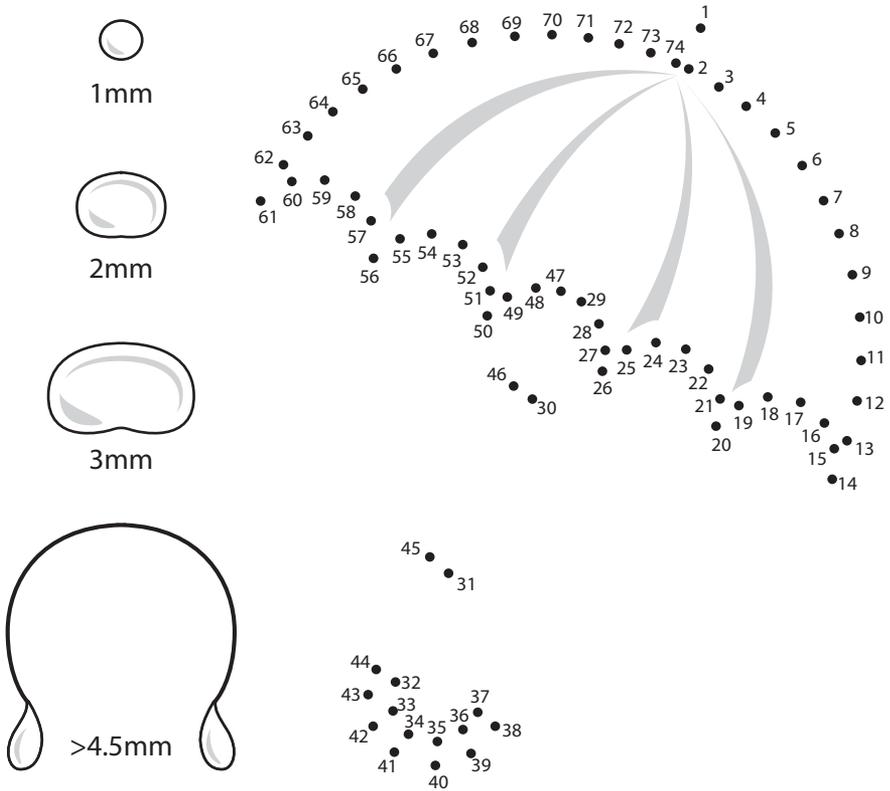


The Direct Readout Laboratory develops tools to view satellite images as soon as the satellite data is received by antennas on Earth. These satellite images are used all over the world and in many different ways. The images help us to fight fires on land, find fish in the sea, and study pollution in the air.

<http://directreadout.sci.gsfc.nasa.gov/>

REAL RAINDROP SHAPES

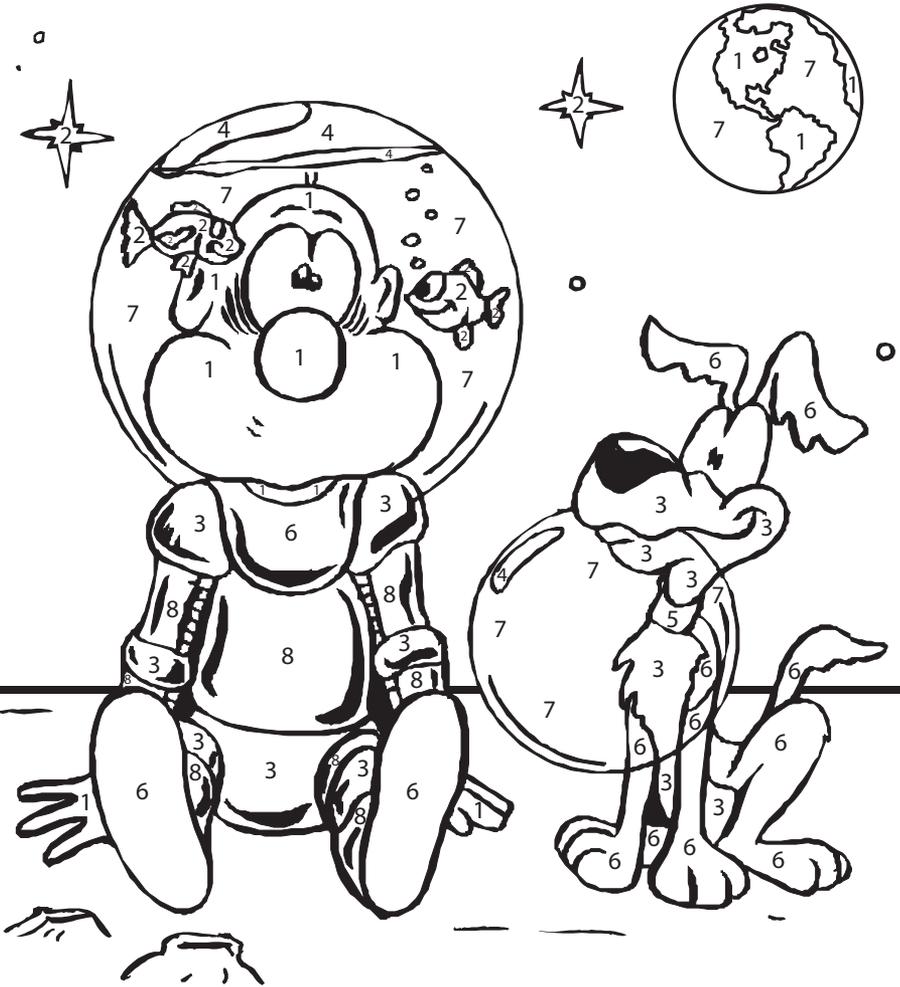
Connect the dots for rain cover



Small raindrops (radius < 1 mm) are spherical; larger ones assume a shape more like that of a hamburger bun. When they get larger than a radius of about 4.5 mm they rapidly become distorted into a shape rather like a parachute with a tube of water around the base --- and then they break up into smaller drops.

TECHNO-COLOR

Color-by-number space travelers



1 - Tan

2 - Yellow

3 - Light Gray

4 - Light Blue

5 - Red

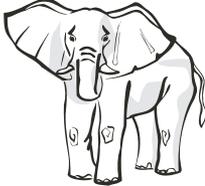
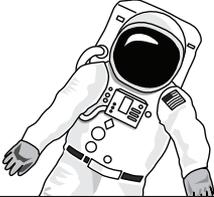
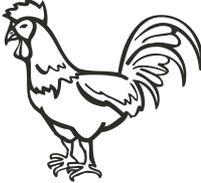
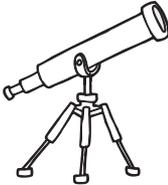
6 - Dark Gray

7 - Blue

8 - Purple

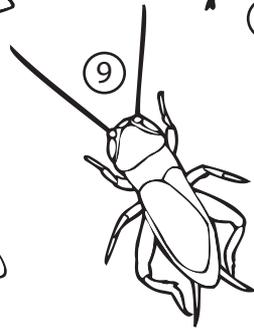
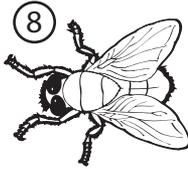
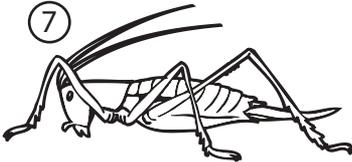
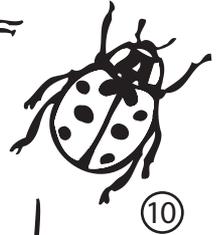
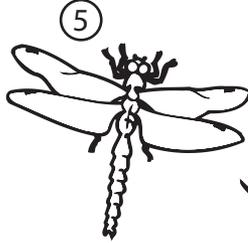
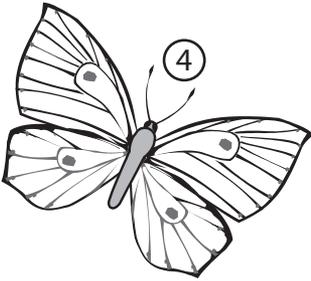
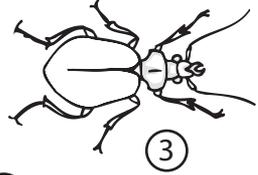
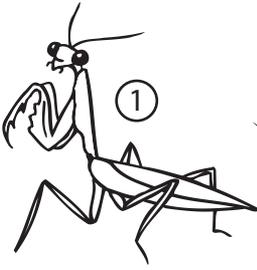
NAME OUR HOME PLANET

Find the answer by writing the first letter of each object in the box beside the picture

STOP BUGGING ME

Name these insects



1. _____

6. _____

2. _____

7. _____

3. _____

8. _____

4. _____

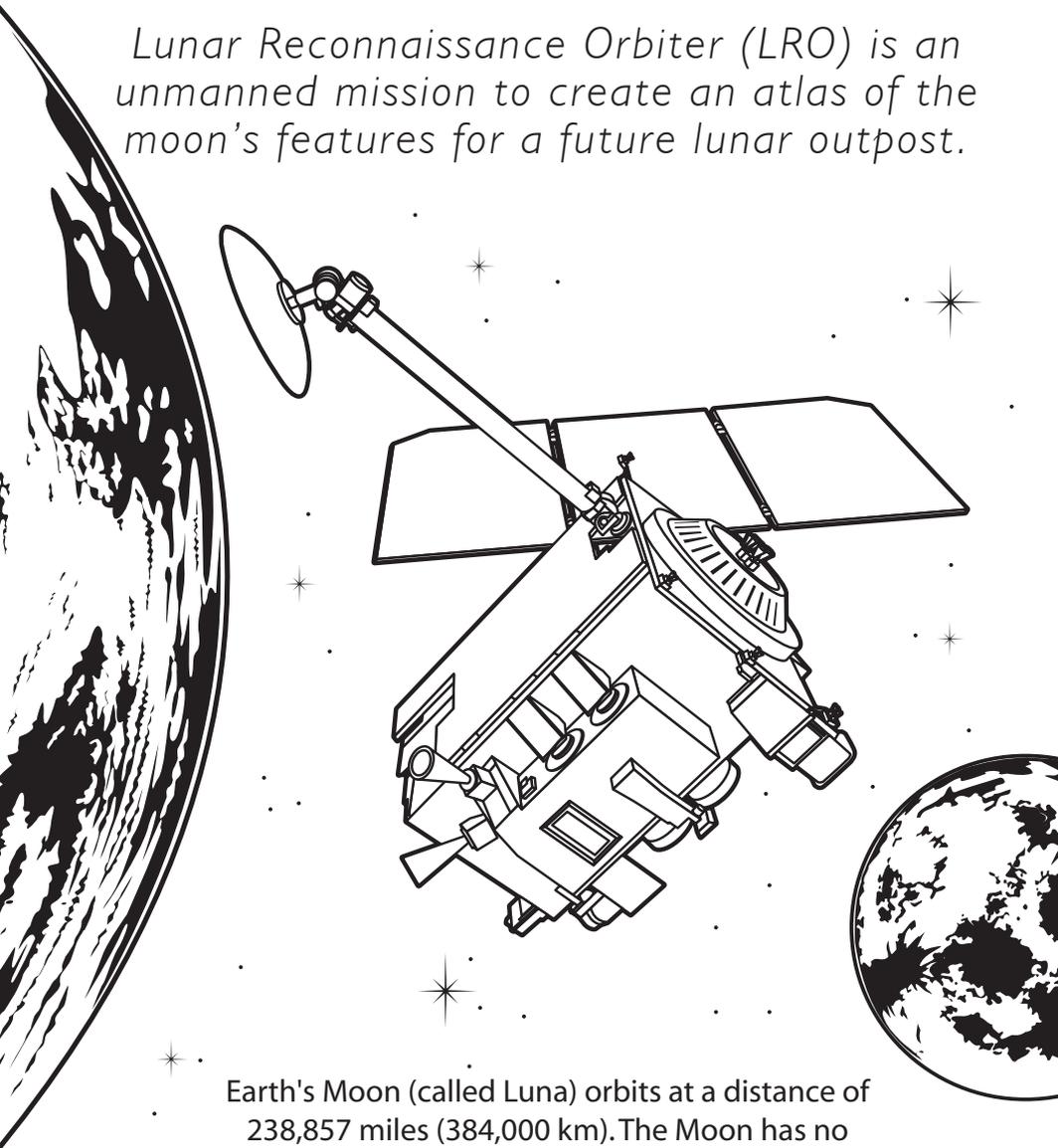
9. _____

5. _____

10. _____

MAPPING THE MOON

Lunar Reconnaissance Orbiter (LRO) is an unmanned mission to create an atlas of the moon's features for a future lunar outpost.

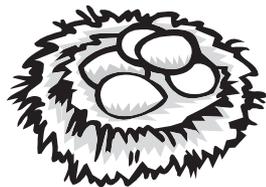
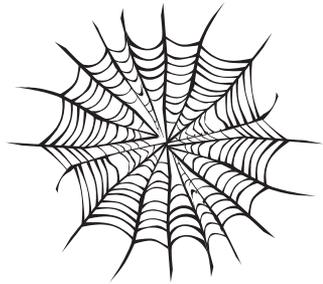
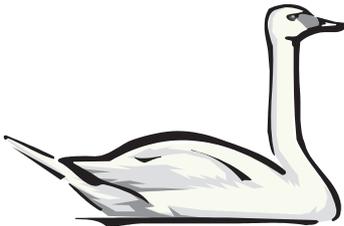
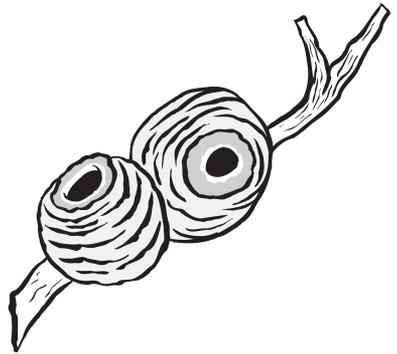
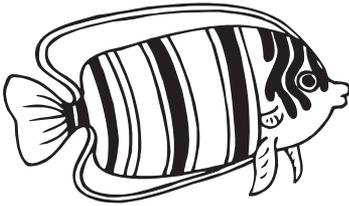
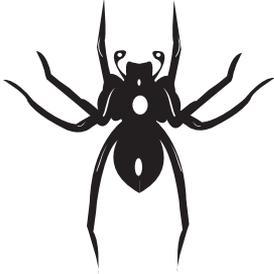


Earth's Moon (called Luna) orbits at a distance of 238,857 miles (384,000 km). The Moon has no atmosphere, but there is water ice in some of the deep craters. The Moon is the only extra-planetary body that a human has visited.

<http://lunar.gsfc.nasa.gov/>

MATCH THEM UP

Where do we belong?



MAKING NEW WORDS

How many words can you spell using the letters in *PRECIPITATION*?



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

Precipitation is moisture that falls from clouds in the form of rain, snow, sleet, or hail.

Without rain or other forms of precipitation, the ground becomes dry, and crops cannot grow.

RECYCLING WORKS

For a happy, healthy planet

Recycle: Take something old and turn it into something new!

Reduce: Find ways to lessen the amount of garbage we throw away.

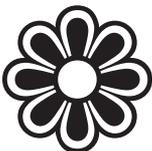
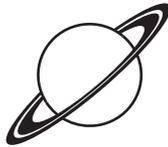
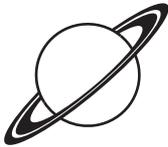
Reuse: Find ways to use things over and over again rather than throw them away.



People all over the world are helping to recycle and take better care of our planet. The most common recyclable items include glass, plastic, paper, and aluminum.

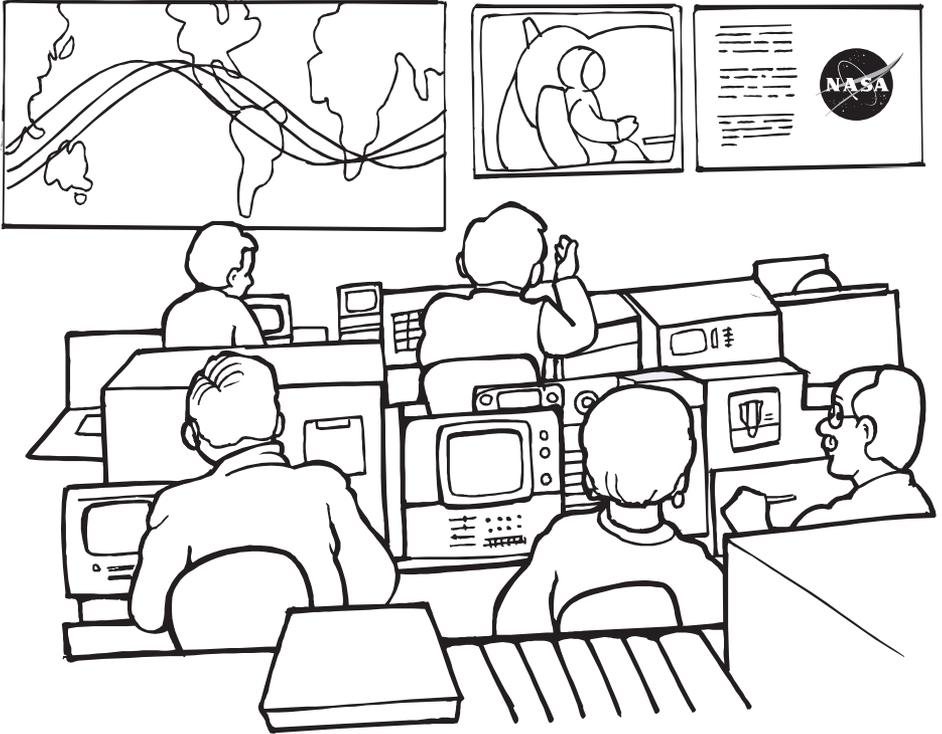
WHAT COMES NEXT?

Draw the picture that comes next in each row



MISSION CONTROL

Color this busy operations center

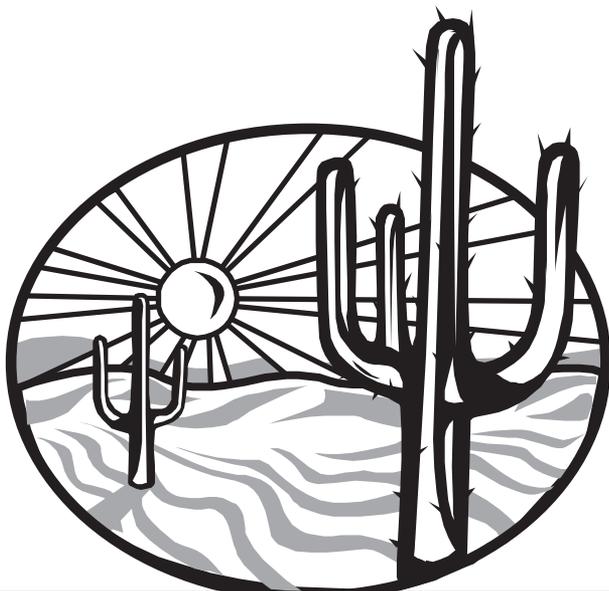


Every day, NASA's satellites are making new breakthroughs in our knowledge of the Earth and the universe. However, none of these successes would be possible without teams of people working behind the scenes. One of the key elements is the flight operations control team for each mission.

These teams are some of the most talented and qualified engineers around the world. They come from a wide variety of educational and career backgrounds who are experts in different areas of satellite technology.

COUNTING ON “NATURE”

How many can you find?



N	A	T	U	R	E	N	T	N
A	N	E	N	A	E	A	A	T
T	A	R	E	R	U	T	A	N
U	T	U	U	U	U	U	A	A
R	U	T	T	R	E	R	T	T
E	A	A	E	N	A	E	R	U
E	N	N	A	T	U	R	E	R

NAME THE 5 OCEANS

Unscramble the letters to find the answers

NTTIACLA

FICPIAC

DANINI

HOTUNSER

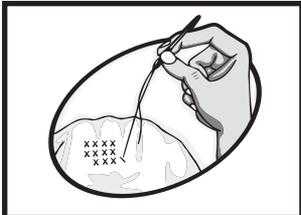
CTAIRC

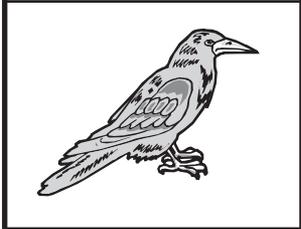


RHYME TIME

What other words rhyme with...

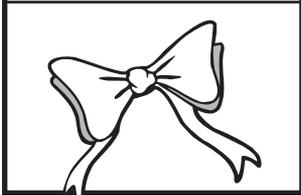
SNOW











WORKING AT NASA

*Can you guess what these people do?
Unscramble the clues.*



GENEIRNE



TCAHREE



HESTCIM

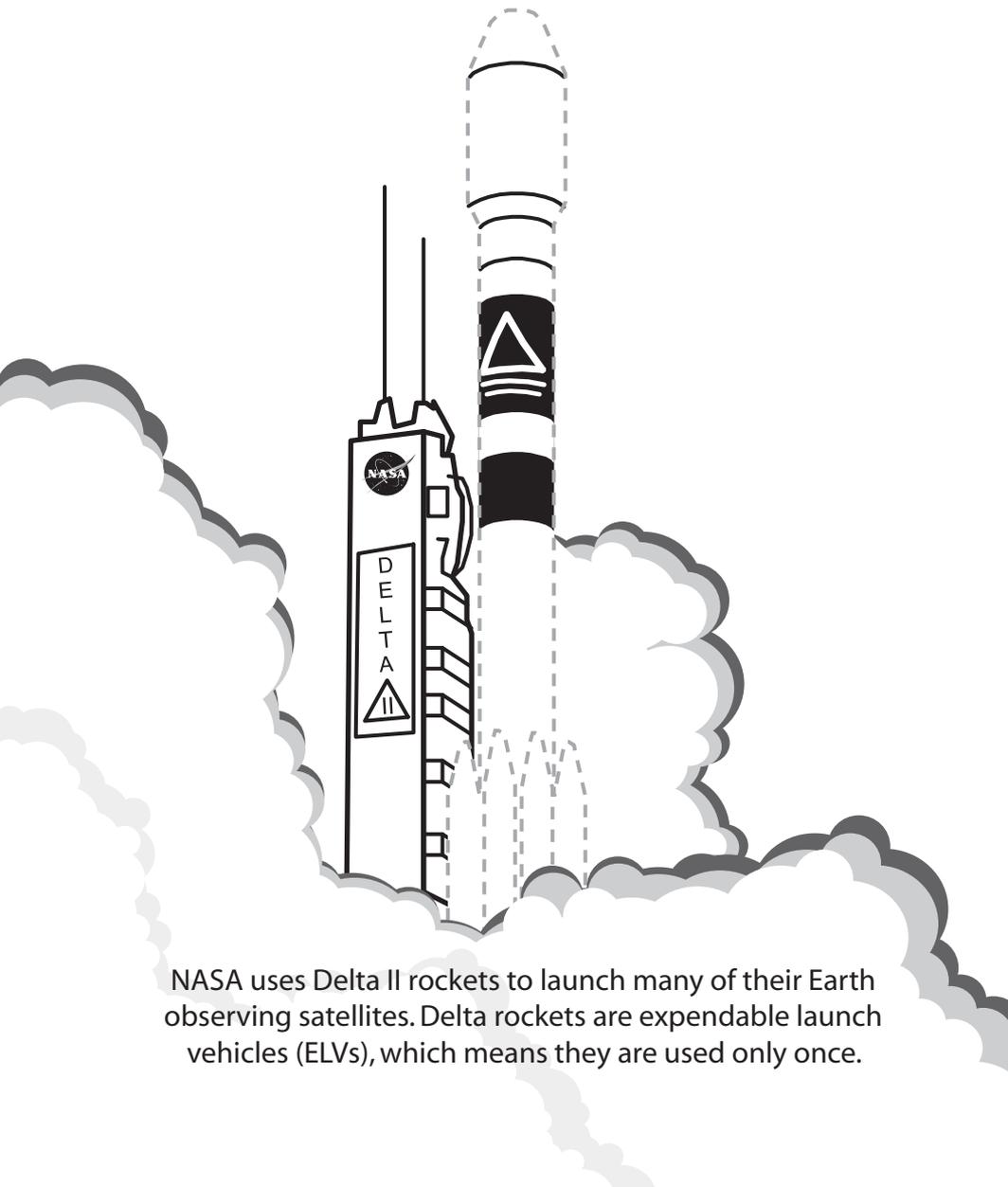


GRAMREPOMR

One of NASA's biggest assets has always been its people. Through distinguished service, ability, courage, and education you can personally make a contribution to the advancement of NASA Earth Science. Choose to be an Atmospheric Scientist, Geologist, Meteorologist, Oceanographer, Marine Biologist, Engineer—the possibilities are endless.

LIFTOFF!

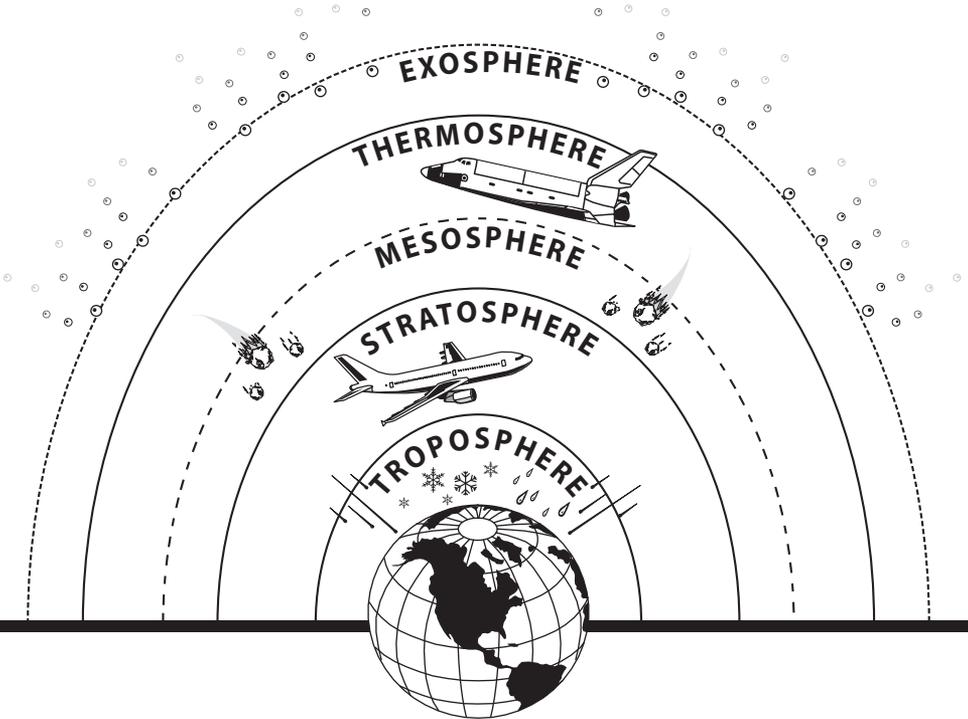
Trace over the dotted line to complete the rocket launch



NASA uses Delta II rockets to launch many of their Earth observing satellites. Delta rockets are expendable launch vehicles (ELVs), which means they are used only once.

FIVE LAYERS OF SPHERES

The makeup of our atmosphere



Troposphere: First layer above the surface and contains half of the Earth's atmosphere. Weather occurs in this layer.

Stratosphere: Many jet aircraft fly in this area because it is very stable. Also, the ozone layer absorbs harmful rays from the Sun.

Mesosphere: In this region, meteors or rock fragments burn up. The top of this area is the coldest part of Earth's atmosphere.

Thermosphere: Auroras occur in this area. It is also where the Space Shuttle orbits.

Exosphere: This very thin region is where atoms and molecules escape into space. This is the upper limit of our atmosphere.

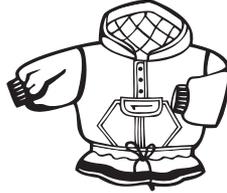
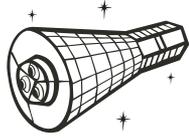
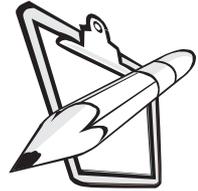
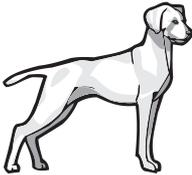
COMPUTER WHIZ

Find and circle these shapes



WHAT DOES NOT BELONG?

Circle the one that doesn't fit in



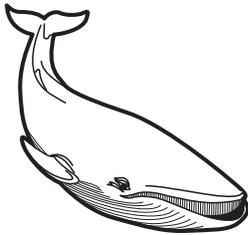
SOUNDS LIKE...

What other words rhyme with HAIL?











UNDER THE SEA

Search for ocean life words

C	D	E	M	F	I	S	H
O	K	A	A	C	R	O	U
N	L	B	N	L	L	U	G
C	S	H	A	R	K	T	P
H	I	N	T	L	N	B	L
O	U	S	E	A	A	I	A
T	F	E	E	R	A	P	N
D	O	C	C	N	M	W	K
E	O	T	S	I	N	E	T
E	L	K	R	H	E	L	O
W	A	H	E	P	K	T	N
A	S	P	L	L	I	R	K
E	O	C	T	O	P	U	S
S	Q	U	I	D	C	T	P

✓ OCEAN
CLAM
COD
CONCH
CRAB

DOLPHIN
EEL
FISH
GULL
KELP

KRILL
MANATEE
OCTOPUS
ORCA
PIKE

PLANKTON
REEF
SEA
SEAWEED
SHARK

SHRIMP
SNAIL
SQUID
TUNA
TURTLE

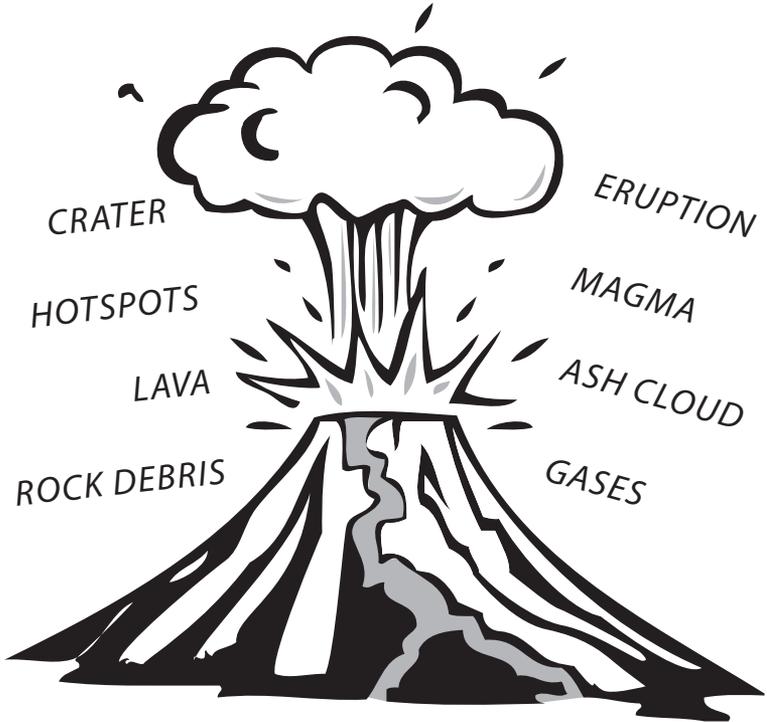
THE SHELL GAME

Match up each sea shell with their shadow



BLOW YOUR TOP

Alphabetize these volcano-related words



1. _____

5. _____

2. _____

6. _____

3. _____

7. _____

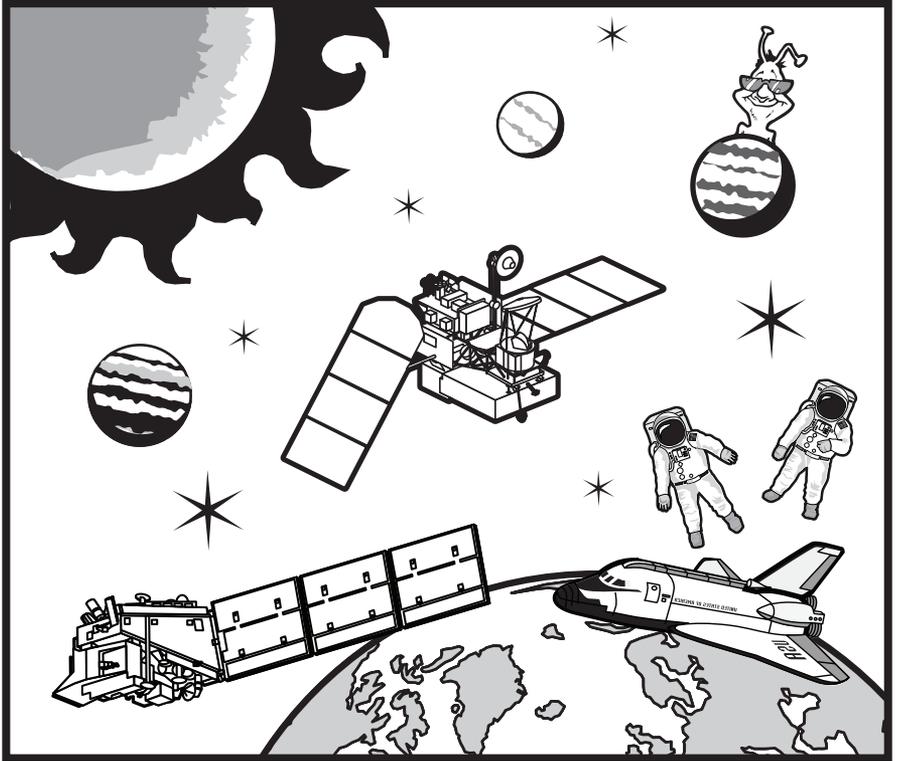
4. _____

8. _____

A volcano is a mountain that opens downward to a pool of molten rock below the surface of the earth. When pressure builds up, eruptions occur. Gases and rock shoot up through the opening and spill over or fill the air with lava fragments.

SPACE COUNTING

How many space objects can you find?



How many aliens? _____

How many astronauts? _____

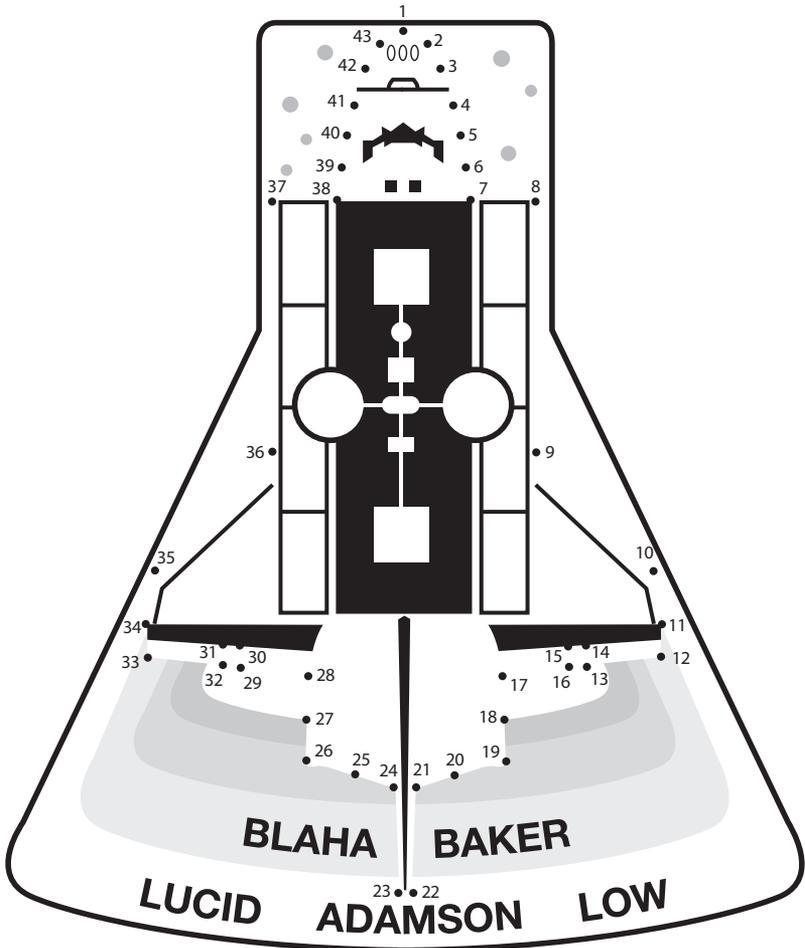
How many spacecraft? _____

How many planets? _____

How many stars? _____

MISSION PATCH

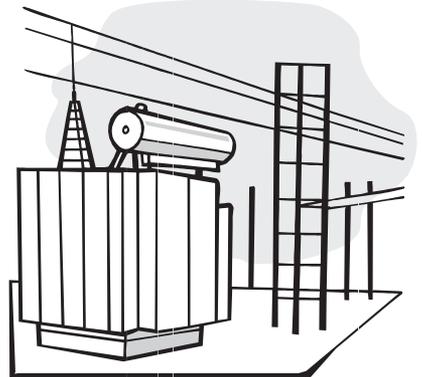
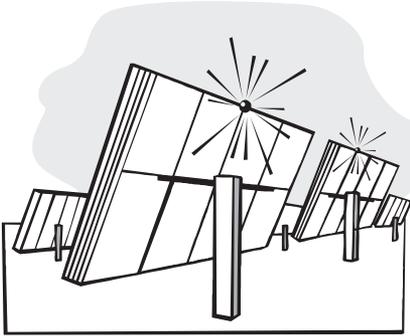
Connect the dots to complete the logo



The Space Shuttle Atlantis mission (STS-43) launched on August 2, 1991. Its primary payload, the Tracking and Data Relay Satellite-5 (TDRS-5) deployed about six hours into flight and propelled satellite into geosynchronous orbit.

RENEW FOR THE FUTURE

Renewable energy can power the Earth



Renewable energy is that form of energy that doesn't exhaust the natural resources of the Earth. We need to use renewable sources of energy. We should strive to eliminate the use of fuels that cannot be recreated or made available again after they have been used once. Solar or wind energy can be converted into electricity. These renewable sources are unlimited and they can help preserve the Earth's environment.

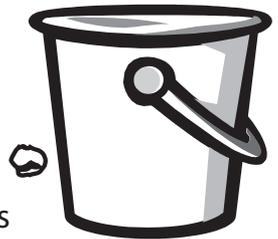
EARTH MATTERS

Earth is made up of many different elements



Chemical Composition of the Earth:

- 32.1% Iron
- 30.1% Oxygen
- 15.1% Silicon
- 13.9% Magnesium
- 2.9% Sulfur
- 1.8% Nickel
- 1.5% Calcium
- 1.4% Aluminum
- 1.2% Trace Elements



A BETTER PLANET FOR ALL

Taking care of the Earth is everyone's job



The Earth still has amazing secrets just waiting to be discovered. We need to help our planet survive by using our creativity and imagination, so one day we can build tools that may help solve the problems we face. The Earth is our home and it is up to all of us to take special care of it.

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National Aeronautics and Space Administration



Earth Science Fun Pad

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